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NOTES ON GEOGRAPHIC DISTRIBUTION

Distribution and natural history notes on *Tachymenis chilensis chilensis* (Schlegel, 1837) (Reptilia: Serpentes: Dipsadidae) in Argentina

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ABSTRACT: We revisit the distribution and natural history data of *Tachymenis chilensis chilensis* (Schlegel, 1837) in Argentina based on compiled and novel records, extending its northern and southern distribution from the previously known localities in Argentina. We recorded two prey items in Argentinean populations: *Rhinella rubropunctata*, reported for the first time, and *Liolaemus pictus*. *Tachymenis c. chilensis* is mainly found in forested habitats, generally near wetlands with abundant populations of amphibians. The latitudinal range occupied by *T. c. chilensis* in Argentina is similar to that in Chile, but its northern distribution limit reaches the lowest latitudes in Chile. This is probably due to the higher humidity levels in the western slopes of the Andes and the barrier effect of the highest mountain ranges in this area.

Tachymenis is a snakes genus inhabiting western South America, from coastal to Andean regions of Peru, Chile and western Bolivia and Argentina (Walker 1945; Myers and Hoogmoed 1974). The genus contains six recognized species: *T. affinis* Boulenger, 1896, *T. attenuata* Walker, 1945, *T. chilensis* (Schlegel, 1837), *T. elongata* Despax, 1910, *T. peruviana* Wiegmann, 1835, and *T. tarmensis* Walker, 1945 (Walker 1945; Peters and Orejas-Miranda 1970; Ortiz 1973; Uetz and Etzold 1996). A seventh described species, *Tachymenis surinamensis* Dunn, 1922, was synonymized with *Philodryas elegans* (Tschudi, 1875) by Myers and Hoogmoed (1974). *Tachymenis chilensis* is distributed in Chile and Argentina, and is recognized to possess two subspecies (Ortiz 1973, Valenzuela-Dellarossa 2010): the northern *T. c. coronellina* (Werner, 1898) and the southernmost subspecies in the genus *T. c. chilensis* (Schlegel, 1837). This species is a small, rare, and scarcely known snake, whose distributional range required revision (Simonetti 2001). Additionally, *T. chilensis* was considered a Vulnerable species in Chile (Simonetti 2001; Vergara *et al.* 2008) and Argentina (Vidoz *et al.* 2011). Recently, Valenzuela-Dellarossa *et al.* (2010) revisited the distribution of *T. chilensis* subspecies in Chile, so most of the known information about morphology, biogeography and natural history of the species was published based on Chilean population studies (e.g., Walker 1945; Donoso-Barros 1966; Ortiz 1973; Greene and Jaksic 1992; Simonetti 2001). In Argentina, data on the distribution of *T. chilensis* is scarce and imprecise without voucher specimens (*e.g.* Cei 1986; Giraudo and Scrocchi 2002; Scolaro 2005; but see Ortiz 1973; Scrocchi *et al.* 2010 and APN 2011 for precise localities). In this contribution we revisited the distribution of *T. chilensis* in Argentina based on the study of existing specimens in museums (Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" (MACN), Museo de La Plata (MLP) and, Fundación Miguel Lillo (FML)). The other specimens listed here were not collected because this is considered a threatened species in Argentina (Vidoz *et al.* 2011), although all records were confirmed by us through photographs and direct observation in the field. Identifying *T. chilensis* in Argentina is unequivocal because it is probably the only species of snakes living in the Patagonian forests and all possible sympatric species are very different in morphology and coloration patterns (*i.e. Bothrops ammodytoides*, *Lystrophis semicinctus, Micrurus pyrrhocryptus, Philodryas patagoniensis*, *P. psammophidea, P. trilineata, Pseudotomodon trigonatus*) (see color patterns and identification guides in Cei 1986; Scolaro 2005; Scrocchi *et al.* 2010). Additionally, we provided the first natural history observations on Argentine populations, including observations on reproduction, diet, and habitat use.

The compiled data (Table 1, Figure 1, N = 46 records) presented here shows that *T. c. chilensis* is distributed in Argentina with extreme records at 36°24'30" S, 70°37'22" W (Neuqu'en province), 42°55'00" S, 71°20'00" W (Chubut province), and 42°12'43" S, 71°50'54" W (Chubut). Our records extend the distribution of *T. chilensis* with precise localities and vouchers to the province of Chubut, where the species was mentioned by Scrocchi *et al.* (2010) but without voucher specimens. Several localities represent the southernmost and northernmost records of this species in Argentina (Ortiz 1973; Cei 1986; Williams and Scrocchi 1994; Giraudo and Scrocchi 2002; Scrocchi *et al.* 2010; Figure 1). The range of altitude occupied by *T. chilensis* in Argentina appears to vary from 200–2000 m a.s.l. (Table 1).

In agreement with the literature about Chilean

populations (Walker 1945; Greene and Jaksic 1992), we recorded the same prey type in Argentinean populations. One individual of *T. c. chilensis* (number 35 in Table 1) was observed swallowing the entire body of an amphibian (*Rhinella rubropunctata*), observed to be protruding from the mouth of the snake (FV pers. obs.). Another specimen (FML 1555, male SVL = 350 mm, TL = 70 mm) had a partially digested lizard (*Liolaemus pictus* with a total length of 120 mm) in its stomach. The direction of ingestion for the two recorded prey individuals was headfirst. Prior to this study, *Rhinella rubropunctata* (Bufonidae) had not been recorded as a prey species of *Tachymenis chilensis* (Walker 1945; Greene and Jaksic 1992), nevertheless, toxic bufonids were cited as prey species of other members of the genus *Tachymenis* (Walker 1945). We recorded four Argentinean and two Chilean gravid females (Table 2). Litter size observed in our study ranged from six to twelve embryos. Two gravid females (MACN 9332 and 14317, Table 2) showed well-developed embryos without calcified shell, covered by a thin transparent membrane, a morphological evidence that supports the viviparity of the subspecies *T. c. chilensis* (Yaron 1985). This reproductive mode was indicated for the species by Walker (1945).

Our data (N = 21) indicated that *T. c. chilensis* inhabits mainly forested habitats (67%, N = 14), including several types of primary and secondary forests, with some records in rivers or lagoon banks (19%, N = 4), gardens (9%, N = 2) and grassland (5%, N = 1), but frequently near to forest patches (Table 1). The northernmost specimen in Argentina (number 1 in Table 1), was observed along a river bank of the arid steppe in the northern parts of Neuquén province, showing the possibility that *T. c. chilensis* survives in drier conditions associated with wetlands, such as was reported in others northern *Tachymenis* subspecies or species (Walker 1945; Donoso-Barros 1966; Greene and Jaksic 1992; Vergara *et al.* 2008). Several individuals of *T. c. chilensis* were observed close to wetlands (rivers, streams, lagoons, lakes) with abundant populations of amphibians

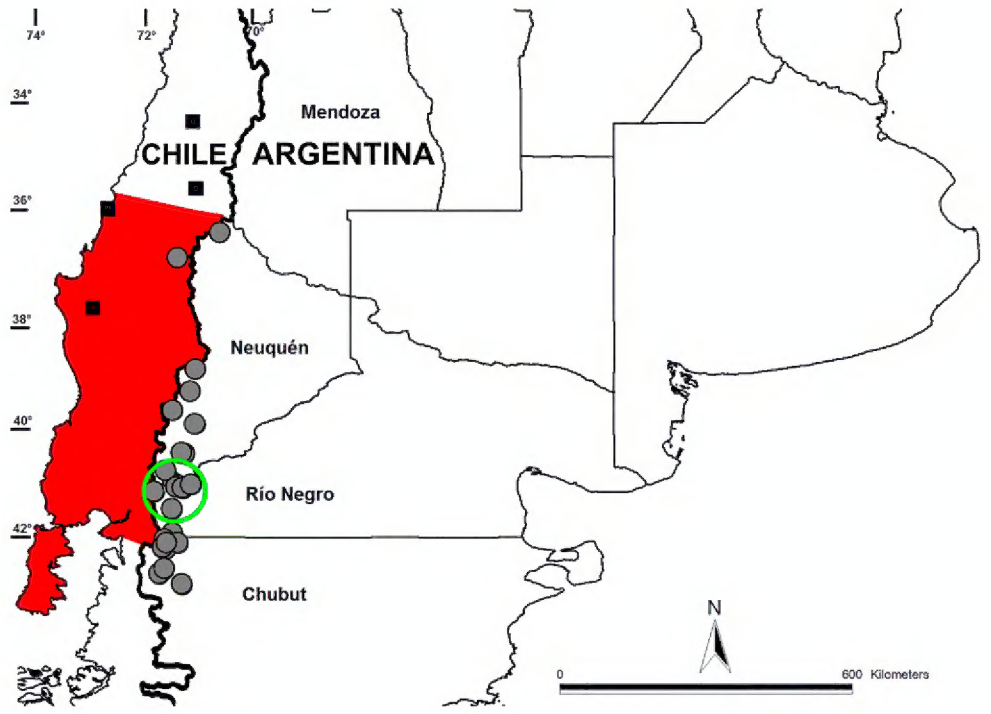

Figure 1. Distribution map of *Tachymenis chilensis chilensis* showing localities compiled by us (Grey circles), northernmost data from Chile (Black squares) and the continuous distribution in Chile (Red area) following Simonetti (2001) and Valenzuela-Dellarossa *et al.* (2010). The green open circle shows the previously known distribution in Argentina mapped by Cei (1986).

Figure 2. Selected specimens of *Tachymenis chilensis chilensis* photographed in Argentina: (a) Lago Moquehue, Neuquén, Photo by B. Blotto. (b) Parque Nacional Lago Puelo, Inicio Senda al Mirador, La Playita, Chubut, Photo by N. Vallejo. (c) Laguna del Plesiosaurio, El Pedregoso, Chubut, Photo by F. Vidoz. (d) Parque Nacional Lago Puelo, Loma de La Vega de El Turbio, Chubut, Photo by F. Vidoz.

(Table 1), their main prey (Greene and Jaksic 1992). The compiled data presented here shows that *T. c. chilensis* inhabits forested habitats, generally near wetlands, from moderate (200 m a.s.l.) to elevated altitudes in Argentina, with the maximum elevation recorded at 2000 m a.s.l. in the northernmost locality (Table 1).

The latitude range occupied by *T. c. chilensis* in Argentina is similar to that in Chile, coinciding with its southernmost distributional limit (Figure 1; Valenzuela-Dellarossa *et al.* 2010). However, near its northernmost distributional limit, *T. c. chilensis* reaches lower latitudes in Chile (34°22' S) than in Argentina (36°24'30" S). This is probably due to the higher humidity levels in the western slopes of the Chilean Andes, and the extreme arid conditions in the eastern Argentinean Andes, were occurred the northern distribution of *T. c. chilensis* (Villagrán and Hinojosa 2005). Additionally, the northernmost distribution of the subspecies in Chile coincides with the highest mountain ranges of the Andes, near Aconcagua Mountain (6962 m a.s.l.), which probably constitute an effective dispersion barrier in these latitudes, between the Chilean and Argentinean populations of *T. chilensis*.

In conclusion, our data show that *T. c. chilensis* has a wider distribution than previously known in Argentina, and we provide the first data on its natural history (habitat use, reproduction and diet) in this country. This study can provide information to better understand the requirements and distribution of *Tachymenis chilensis* and to implement conservation strategies of this "species categorized as Vulnerable in Argentina".

Table 1. Records compiled by us including photographed and museum vouchers specimens (FML: Fundación Miguel Lillo collection, Tucumán; MACN: Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires; CENAI: Centro Nacional de Investigaciones Iológicas collection, actually housed in the MACN).

N°	Localities	Coordinates	Province	Altitude (m a.s.l)	Date	Habitat	Voucher specimens
1	Río Varvarco, near Laguna Varvarco Tapia	36°24'30" S, 70°37'22" W	Neuquén	2000	16 Mar 2008	River bank in steppe with rocks.	Photographed
2	Cordillera de Nahuel Buta	37°48'04" S, 72°58'08"W	Chile	1100	22 Dic 1985		FML 1641
3	Cordillera de Nahuel Buta	37°48'04" S, 72°58'08" W	Chile	1100	23 Dic 1985		FML 1642
4	Cordillera de Nahuel Buta	37°48'04" S, 72°58'08" W	Chile	1100	23 Dic 1985		FML 1643
5	Lago Moquehue	38°59'18" S, 71°23'57" W	Neuquén	1500	9 Jan 2009	Mixed forest of *Nothofagus* and *Araucaria.*	MACN 41525
6	Lago Quillén	38°22'07" S, 71°13'50" W	Neuquén	1015	20 Feb 1968		MACN 27688
7	Lago Quillén	38°22'07" S, 71°13'50" W	Neuquén	1015	23 Feb 1968		MACN 27689
8	Parque Nacional Lanín, Lago Paimún, sendero al Volcán Lanín	39°41'45" S, 71°30'28" W	Neuquén	1500	20 Jan 2009	Humid mixed forest of *Nothofagus* and *Araucaria.*	
9	Junín de los Andes	39°25'33" S, 71°05'06" W	Neuquén	930	Feb 1979		MACN 32197
10	Parque Nacional Lanín, Lago Paimún, sendero al Volcán Lanín	39°42'8" S, 71°30'17" W	Neuquén	1300	20 Jan 2009	Humid mixed forest of *Nothofagus* and *Araucaria.*	
11	Parque Nacional Lanín, camino de entrada al Lago Filo Hua-Hum (5 km de la Ruta Prov. 63)	40°30'07" S, 71°16'59" W	Neuquén	950	30 Jan 1995		FML 2602
12	Parque Nacional Nahuel Huapi, Isla Victoria, Lago Nahuel Huapi, Puerto Radal	40°48'48" S, 71°38' 09" W	Neuquén	840	Jan 1947		MACN 9332
13	Parque Nacional Nahuel Huapi, Isla Victoria, Lago Nahuel Huapi, Puerto Radal	40°48'50" S, 71°38'09" W	Neuquén	840	Jan 1947		MACN 9333
14	Parque Nacional Nahuel Huapi, Isla Victoria, Lago Nahuel Huapi	40°58'13" S, 71°31'14" W	Neuquén	830	1945		MACN 1893
15	Puerto Huemul, Neuquén	41°01'57" S, 71°24'57" W	Neuquén	800			MACN (NE) 1894
16	San Carlos de Bariloche, Colonia Suiza, Lago Moreno	41°07'00" S, 71°26'00" W	Río Negro	800	Jan 1973		CENAI 3342
17	San Carlos de Bariloche	41°08'00" S, 71°18'00" W	Río Negro	780	22 Jul 1946		FML 00271
18	San Carlos de Bariloche	41°08'00" S, 71°18'00" W	Río Negro	780	01 Jun 1946		FML 1555
19	San Carlos de Bariloche, La Paloma	41°09'30" S, 71°18'58" W	Río Negro	925	21 Jun 1980		MACN 35854
20	Parque Nacional Nahuel Huapi, Río Manso Inferior, Población Huenchupán	41°31'18" S, 71°31'27" W	Río Negro	535	Summer 1981	Humid forest of *Notophagus antarctica* near a wetland with abundant frogs *Batrachyla taeniata.*	
21	El Bolsón	41°58'03" S, 71°30'56" W	Río Negro	310	1962		MACN 14317
22	El Bolsón	41°58'03" S, 71°30'56" W	Río Negro	310	1962		MACN 14318

Table 1. *Continued.*

N°	Localities	Coordinates	Province	Altitude (m a.s.l)	Date	Habitat	Voucher specimens
23	El Bolsón	41°58'03" S, 71°30'56" W	Río Negro	310	1962		MACN 14319
24	El Bolsón	41°58'03" S, 71°30'56" W	Río Negro	310	10 Jan 1963		MACN 15313
25	El Bolsón	41°58'03" S, 71°30'56" W	Río Negro	310	03 Feb 1967		MACN 28013
26	El Bolsón	41°58'03" S, 71°30'56" W	Río Negro	310	03 Feb 1967		MACN 28014
27	Río Azul	41°59' 53" S, 71°32'51" W	Río Negro	280	15 Jan 1963		MACN 15314
28	Cajón del río Azul	41°59' 53" S, 71°32'51" W	Río Negro	280	Nov 2007		FML 20791
29	Lago Puelo Village	42°03'30" S, 71°35'44" W	Chubut	220	18 Feb 2002	Garden near forest of *Austrocedrus chilensis* and *Pinus.* Canal irrigation at 50 m, with frogs *Pleurodema thaul.*	
30	Parque Nacional Lago Puelo, Delta del río Azul	42°05'15" S, 71°37'11"W	Chubut	205	23 Jan 2004	River bank near modified forest and grassland.	
31	Parque Nacional Lago Puelo, Delta del río Azul	42°05'32" S, 71°37'16" W	Chubut	205	09 Apr 1995	River bank with rocks near modified forest and grassland. With abundant *Rhinella spinulosa* and *Pleurodema thaul* in the vicinity.	
32	Parque Nacional Lago Puelo, Inicio Senda al Mirador, La Playita	42°05'53" S, 71°36'22" W	Chubut	205	09 Oct 2010	Mixed forest and stream, in sand.	Photographed
33	Parque Nacional Lago Puelo, Camping Las Lágrimas	42°05'56" S, 71°40'59" W	Chubut	200	15 Jan 2002	Secondary forest of *Austrocedrus chilensis*. Stream at 100 m.	
34	Parque Nacional Lago Puelo, Cerro Cuevas	42°08'00" S, 71°40'03" W	Chubut	985	30 Oct 1996	Grassland (recently fired) near forest of *Nothofagus antarctica*. Small stream at 50 m.	
35	Parque Nacional Lago Puelo, El Desemboque	42°08'50" S, 71°36'13"W	Chubut	400	18 Dic 2009	Forest of *Austrocedrus chilensis* near stream.	
36	Parque Nacional Lago Puelo, El Desemboque	42°08'50" S, 71°36'13" W	Chubut	400	18 Jan 2010	Forest of *Austrocedrus chilensis* near stream.	
37	Parque Nacional Lago Puelo, Senda Huella Andina, Cerro Currhumahuida	42°09'02" S, 71°37'05" W	Chubut	800	15 Jan 2010	Forest of *Austrocedrus chilensis.*	A sloughed skin
38	Laguna del Plesiosaurio, El Pedregoso	42°09'13" S, 71°24'59"W	Chubut	240	20 Oct 2002	Lagoon bank near forest of *Austrocedrus chilensis.*	Photographed
39	Lago Esperanza	42°12'43" S, 71°50'54" W	Chubut	500	1995		Photographed
40	Parque Nacional Lago Puelo, Seccional Guardaparque El Turbio	42°13'41" S, 71°40'04" W	Chubut	205	02 Jan 2006	Garden near stream and forest of *Austrocedrus chilensis*.	Photographed
41	Parque Nacional Lago Puelo, Loma de La Vega de El Turbio	42°14'49" S, 71°42'25" W	Chubut	300	01 Mar 2008	Forest of *Austrocedrus chilensis.*	Photographed
42	Faldeo Cordón Derrumbe	42°15'02" S, 71°38'58" W	Chubut	1000	12 Feb 2007	Shrubland of *Notophagus antarctica, Chusquea culeou* and *Embothrium coccineum*.	Photographed
43	Parque Nacional Los Alerces, Isla Don Vicente, Lago Rivadavia	42°37'16" S, 71°40' 06" W	Chubut	520		Mixed forest of *Austrocedrus chilensis* and *Nothofagus dombeyi.*	
44	Parque Nacional Los Alerces, Camping Población Neira, Lago Rivadavia	42°38'18" S, 71°40'21" W	Chubut	525	Feb 2007	Mixed forest of *Austrocedrus chilensis* and *Nothofagus dombeyi.*	
45	Parque Nacional Los Alerces, Río Menéndez	42°43'50" S, 71°45'06" W	Chubut	520		Humid forest of *Nothofagus dombeyi.*	Photographed
46	Esquel, Parque Nacional Los Alerces	42°55'00" S, 71°20'00" W	Chubut	560	1972		CENAI 3448

Table 2. Reproductive data of gravids females of *Tachymenis c. chilensis* recorded by us (FML: Fundación Miguel Lillo collection, Tucumán; MACN: Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires; SVL: snouth-vent length; TL: tail length).

Specimen number	Measurements		Month	Reproductive data
	SVL (mm)	TL (mm)		
MACN 9332	390	63.3	January	Ten developed embryos
MACN 14317	415	45	No data	Twelve developed embryos
MACN 28014	376	81	3 February	Six eggs without shell and visible embryos
FML 00271	400	75	22 Jul	Six eggs without shell and visible embryos
FML 1641	335	62	22 December	Seven embryos
FML 1642	333	60	23 December	Six embryos

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